IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application : **10/028,386**

Applicant(s) : **CHEN et al.**

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On: **21 November 2006**

By: _____

Title: **SYSTEM FOR REALIZATION OF COMPLEXITY SCALABILITY IN A LAYERED VIDEO CODING FRAMEWORK**

Mail Stop: **APPEAL BRIEF - PATENTS**
Commissioner for Patents
Alexandria, VA 22313-1450

APPEAL UNDER 37 CFR 41.37

Sir:

This is an appeal from the decision of the Examiner dated 3 July 2006, rejecting claims 1, 4-8, 11-13, 15-19, and 21-25 of the subject application. One or more of these claims have been at least twice rejected.

This paper includes (each beginning on a separate sheet):

1. **Appeal Brief;**
2. **Claims Appendix;**
3. **Evidence Appendix;**
4. **Related Proceedings Appendix; and**
5. **Credit Card Authorization ($500).**

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APPEAL BRIEF

I. REAL PARTY IN INTEREST

The above-identified application is assigned, in its entirety, to **Koninklijke Philips Electronics N. V.**

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any co-pending appeal or interference that will directly affect, or be directly affected by, or have any bearing on, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 2-3, 9-10, 14, and 20 are canceled.

Claims 1, 4-8, 11-13, 15-19, and 21-25 are pending in the application.

Claims 8 and 18 stand rejected by the Examiner under 35 U.S.C. 101.

Claims 1, 4-8, 11-13, 15-19, and 21-25 stand rejected by the Examiner under 35 U.S.C. 103(a).

These rejected claims are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection in the Office Action of 3 July 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This invention addresses a layered video encoding and decoding system. In an example embodiment (page 2, lines 16-19; applicants' FIG. 2), a video encoding system encodes a video signal (20) to provide an encoded base layer (22) and one or more encoded enhancement layers (36). The encoding system selects (34) from among a plurality of discrete cosine transform (DCT) modules (30) to provide the encoded enhancement layers at different precisions (page 5, line 20 – page 6, line 2). The decoding system (page 3, lines 12-17; FIG. 4)

receives an encoded signal (52, 54) and selects (64) from among a plurality of inverse discrete cosine transform (IDCT) modules (68) to provide a video signal (50, 72) at a desired quality/fidelity level (page 7, lines 1-6).

As claimed in independent claim 1, an embodiment of the invention comprises (page 2, lines 16-19) a layered video encoding system (FIG. 2), comprising:

a base layer encoder (14) that is configured to receive a video signal (20) and to provide a base layer stream (22) based on the video signal; and

an enhancement layer encoder (32) that is configured to receive a difference (13) signal and to provide an enhancement layer video stream (36) based on the difference signal, and includes:

a plurality of discrete cosine transform (DCT) modules (30), each providing a different precision, and

a selection system (34) that is configured to select a DCT module of the plurality of DCT modules (30) for performing DCT computation on the difference signal. (Page 5, line 17 – page 6, line 4.)

As claimed in independent claim 8, an embodiment of the invention comprises (page 2, line 20 – page 3, line 4) a computer-readable storage medium storing computer program product including executable instructions for encoding a layered video signal, the program product (FIG. 2) comprising:

means (14) for receiving a video signal (20) and outputting an encoded base layer stream (22); and

means (32) for encoding an enhancement layer (36), wherein the enhancement layer encoding means includes a plurality of discrete cosine transform (DCT) modules (30), each providing a different precision, and selection means (34) for selecting a DCT module of the plurality of DCT modules (30) for performing DCT computation. (Page 5, line 17 – page 6, line 4.)

As claimed in independent claim 11, an embodiment of the invention comprises (page 3, lines 5-11) a method of encoding a video signal in a layered manner (FIG. 2), comprising:

receiving the video signal (20) in a base layer encoding system (14);

outputting an encoded base layer stream (22);

receiving data from the base layer encoding system into an enhancement layer encoding system (32) that includes a plurality of discrete cosine transform (DCT) modules (30),

selecting (34) a discrete cosine transform (DCT) module of a plurality of DCT modules (30) for performing DCT computation on the data; and

generating an encoded enhancement layer stream (36) using the select DCT module,

wherein each of the plurality of DCT modules provides a different precision. (Page 5, line 17 – page 6, line 4.)

As claimed in independent claim 12, an embodiment of the invention comprises (page 3, lines 12-17) a layered video decoding system (FIG. 4), comprising:

a base layer decoder (42) for receiving and decoding a base layer video stream (54); and

an enhancement layer decoder (60) for receiving an enhancement layer video stream (52) and generating a decoded enhanced video output (72), wherein:

the base layer decoder (42) includes a single inverse discrete cosine transform (IDCT) module, and

the enhancement layer decoder (60) includes:

a plurality of IDCT modules (68); and

a selection system (64) for selecting an IDCT module of the plurality of IDCT modules (68) based on factors including an available level of computing resources. (Page 6, line 21 – page 7, line 6.)

As claimed in independent claim 18, an embodiment of the invention comprises (page 3, lines 18-23) a computer-readable storage medium storing computer program product including executable instructions for decoding a layered video stream, the program product (FIG. 4) comprising:

means (42) for receiving and decoding a base layer video stream (54); and

means (60) for receiving an enhancement layer video stream (60) and generating a decoded enhanced video output (72),

wherein

the means for receiving and decoding the base layer video stream includes a single inverse discrete cosine transform (IDCT) module, and

the means for receiving and decoding the enhancement layer video stream includes:

a plurality of IDCT modules (68); and

means (64) for selecting one of the IDCT modules based on at least one of an available level of computing resources, an encoding bit rate, a required quality level, a decoder capability and a bandwidth availability. (Page 6, line 21 – page 7, line 6.)

As claimed in independent claim 21, an embodiment of the invention comprises (page 4, lines 1-7) a method of decoding a layered video stream (FIG. 4), comprising:

receiving an encoded base layer stream (54) into a base layer decoder (42);

decoding the encoded base layer stream (54) using a single inverse discrete cosine transform (IDCT) and generating a decoded base layer stream (50);

receiving an encoded enhancement layer stream (52) into an enhancement layer decoder (60) that includes a plurality of IDCT modules (68);

selecting (60) an IDCT module of the plurality of IDCT modules (68) based on at least one of an available level of computing resources, an encoding bit rate, a required quality level, a decoder capability and a bandwidth availability; and

decoding the encoded enhancement layer (52) using the select IDCT module. (Page 6, line 21 – page 7, line 6.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 8 and 18 stand rejected under 35 U.S.C. 101.

Claims 1, 4-8, 11, and 22-25 stand rejected under 35 U.S.C. 103(a) over Wu (USP 6,614,936) and Mishima (USP 5,488,418).

Claims 12-13, 15-19, and 21 stand rejected under 35 U.S.C. 103(a) over DeBonet (USP 6,510,177) and Strongin (USP 5,872,866).

VII. ARGUMENT

Claims 8 and 18 stand rejected under 35 U.S.C. 101

Claims 8 and 18

The Office action asserts that because a computer program product contains instructions that can be listed as a computer program on a piece of paper, the applicants' claims are directed to non-statutory subject matter. The applicants note, however, that the applicants are not claiming a computer program on a piece of paper. The fact that a part of a claimed invention can be extracted and configured as non-patentable material has no bearing on the patentability of the claimed invention.

MPEP 2106 states:

> "Office personnel have the burden to establish a prima facie case that the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result. Only when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. 101. Compare *Musgrave*, 431 F.2d at 893, 167 USPQ at 289; *In re Foster*, 438 F.2d 1011, 1013, 169 USPQ 99, 101 (CCPA 1971).

The Office action's assertion, that the claims are to be rejected because a program listing can be produced from the claimed computer media, does not address the claimed invention as a whole, and the Office action's premise for supporting this rejection does not show that the claimed invention is directed solely for producing such a program listing.

Because the Office action fails to establish a prima facie case that the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result, the applicants respectfully maintain that the rejection of claims 8 and 18 under 35 U.S.C. 101 is unfounded, per MPEP 2106.

Claims 1, 4-8, 11, and 22-25 stand rejected under 35 U.S.C. 103(a) over Wu and Mishima

Claims 1, 4-7, and 22-23

The Office action acknowledges that Wu does not teach an enhancement layer encoder that includes a plurality of discrete cosine transform (DCT) modules of different precisions and a selection system for selecting a DCT module to perform DCT computation on a difference signal, and relies upon Mishima for this teaching.

MPEP 2143 states:

> "THE PRIOR ART MUST SUGGEST THE DESIRABILITY OF THE CLAIMED INVENTION ... The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). ... The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)".

The applicants respectfully maintain that there is no suggestion in the prior art to combine Wu and Mishima as proposed by the Examiner to provide a plurality of DCT transforms for encoding an enhancement layer.

Neither Wu nor Mishima teaches or suggests applying a DCT transform in the encoding of the enhancement layer. Wu does not teach or suggest applying a DCT transform in the enhancement layer encoding. Mishima does not teach or suggest enhancement layer encoding, and thus cannot be said to teach or suggest applying a DCT transform in the enhancement layer encoding.

Wu teaches a DCT 208 that is used to encode the base layer encoding, and teaches that the output of this DCT 208 in the base layer encoder is used as an input to the enhancement layer encoder. There is no suggestion in Wu or Mishima to include a DCT in an enhancement layer encoder, and no suggestion to include a plurality of DCTs of different precisions in an enhancement layer encoder, as specifically claimed in claim 1. Absent the applicants' disclosure,

there is no suggestion to create the combination suggested by the Examiner to place Mishima's DCTs into Wu's enhancement layer encoder.

The Office action asserts that one of ordinary skill in the art would be motivated to combine Mishima's DCTs with Wu's enhancement layer encoder "so as to accurately, efficiently encode and decode image data with as few errors as possible during transmission while maintaining image quality". The applicants further maintain that this asserted rationale has no bearing on the suggested combination. Of particular note, a DCT with finite precision is not a lossless transform, and will not facilitate "encoding image data with as few errors as possible", compared to Wu's enhancement layer encoding without a DCT.

Because there is no suggestion in the prior art to place a plurality of DCTs into Wu's enhancement layer encoder, as suggested by the Examiner, the applicants respectfully maintain that the rejection of claims 1, 4-7, and 22-23 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2143.

Additionally, assuming in argument that one were to combine Wu and Mishima as proposed by the Examiner, the applicants respectfully note that a combination of Wu and Mishima does not teach or suggest the applicants' claimed invention.

MPEP 2142 states:

> "To establish a *prima facie* case of obviousness ... the prior art reference (or references when combined) ***must teach or suggest all the claim limitations***... If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness."

The Office action acknowledges that both Wu and Mishima fail to teach a plurality of DCTs of different precisions. Wu does not teach a plurality of DCTs (Office action, page 5, last paragraph), and each DCT of Mashima's plurality of DCTs has the same precision (Office action, page 6, lines 9-10).

Because the asserted combination of Wu and Mishima fails to teach or suggest a plurality of DCTs, each having a different precision, as specifically claimed in claim 1, the applicants respectfully maintain that the rejection of claims

1, 4-7, and 22-23 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2142.

Claims 8 and 24-25

As detailed above, there is no suggestion in the prior art to combine Wu and Mishima. Therefore, the applicants respectfully maintain that the rejection of claims 8 and 24-25 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2143.

Further, the proposed combination of Wu and Mishima fails to teach or suggest a plurality of discrete cosine transform (DCT) modules, each providing a different precision, as specifically claimed in claim 8, upon which claims 24 and 25 depend. Therefore, the applicants respectfully maintain that the rejection of claims 8 and 24-25 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2142.

Claim 11

As detailed above, there is no suggestion in the prior art to combine Wu and Mishima. Therefore, the applicants respectfully maintain that the rejection of claim 11 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2143.

Further, the proposed combination of Wu and Mishima fails to teach or suggest a method wherein each of a plurality of DCT modules provides a different precision, as specifically claimed in claim 11. Therefore, the applicants respectfully maintain that the rejection of claim 11 under 35 U.S.C. 103(a) over Wu and Mishima is unfounded, per MPEP 2142.

Claims 12-13, 15-19, and 21 stand rejected under 35 U.S.C. 103(a) over DeBonet and Strongin

Claims 12-13, 15-19, and 21

The applicants respectfully maintain that there is no suggestion in the prior art to combine DeBonet and Strongin as proposed by the Examiner.

The Office action acknowledges that DeBonet fails to teach an enhancement layer decoder having a plurality of inverse discrete cosine transforms (IDCTs). Strongin teaches a plurality of inverse discrete cosine transforms, but does not teach that these transforms are used to decode an enhancement layer. Strongin does not teach enhancement layer decoding; all of Strongin's decoding is effectively at a base layer.

The Office action asserts that one of ordinary skill in the art would be motivated to combine DeBonet and Strongin "so as to reduce the computational burden of the video decoding by selecting a highly efficient inverse discrete cosine transform which is optimized for particular picture characteristics." The applicants respectfully maintain that this motivation is applicable to single-layer encoding systems, such as Strongin's, which does not inherently provide for selective decoding for different display resolutions/precisions, but does not, per se, provide motivation in a multi-layer encoding system, such as DeBonet's, because DeBonet's system is specifically designed to facilitate different display resolutions/precisions without the use of Strongin's techniques.

DeBonet provides encoded enhancement layer data that can be selectively decoded to a desired/subscribed level of resolution/fidelity:

> "The enhancement layer decoder module 280 receives a subscribed enhancement layer 350, ignores any part of the enhancement layer 330 that is not subscribed (i.e. an unsubscribed enhancement layer 360), and decodes the subscribed enhancement layer 350" (DeBonet, column 9, lines 37-41); and
> "Further, the amount of enhancement provided by the enhancement layer decoder module 280 may be varied to some degree (without any modification to the enhancement layer data) by decoding only the amount of information within the enhancement layer needed to provide the enhancement desired. This is accomplished in part by decoding

more bits of information contained in the enhancement layer in order to increase the fidelity of the decoded layer. Typically, the amount of enhancement subscription is user selected but, alternatively, may be selected by others (such as a cable service provider or a television manufacturer) or may depend on the computational resources available in the decoder." (DeBonet, column 16, lines 5-17.)

Both DeBonet and Strongin teach techniques for providing variable display resolution/fidelity. DeBonet teaches selective decoding fidelity by ignoring unneeded or unsubscribed parts of the enhancement layer data. Strongin's system, on the other hand, is not designed for encodings with enhancement layer data, and Strongin is not able to merely ignore parts of such enhancement data. Instead, Strongin teaches processing the incoming DCT-encoded blocks to determine the amount of detail contained in each block, and selectively routing the DCT-encoded blocks to different IDCT modules depending upon the amount of detail in each block, to provide the "highly efficient inverse discrete cosine transform which is optimized for particular picture characteristics" cited in the Office action.

Given that both DeBonet and Strongin provide selectable display fidelity, and that DeBonet's system requires few, if any, additional components to achieve this selectable fidelity, one of ordinary skill in the art would not be motivated by Strongin's use of a plurality of IDCT modules to provide different decoding fidelities, and Strongin's use of an image processing device that determines particular picture characteristics to select from among these IDCT modules, to add Strongin's complexity to DeBonet's system.

Because neither Strongin nor DeBonet teach or suggest an enhancement layer decoder with a plurality of IDCT modules, and because there is no suggestion in the prior art to combine these teaching to provide a plurality of IDCT modules at an enhancement layer decoder, the applicants respectfully maintain that the rejection of claims 12-13, 15-19, and 21 under 35 U.S.C. 103(a) over DeBonet and Strongin is unfounded, per MPEP 2143.

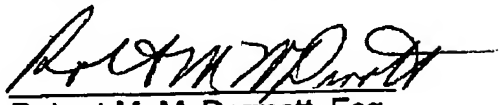
CONCLUSIONS

Because the applicants' claims are directed to a new and useful item of manufacture, the applicants respectfully request that the Examiner's rejection of claims 8 and 18 under 35 U.S.C. 101 be reversed by the Board, and the claims be allowed to pass to issue.

Because there is no suggestion in the prior art to combine Wu and Mishima, and because such a combination does not teach or suggest each of the elements of each of the independent claims 1, 8, and 11, the applicants respectfully request that the Examiner's rejection of claims 1, 4-8, 11, and 22-25 under 35 U.S.C. 103(a) over Wu and Mishima be reversed by the Board, and the claims be allowed to pass to issue.

Because there is no suggestion in the prior are to combine Strongin and DeBonet, the applicants respectfully request that the Examiner's rejection of claims 12-13, 15-19, and 21 under 35 U.S.C. 103(a) over Strongin and DeBonet be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted



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CLAIMS APPENDIX

1. A layered video encoding system, comprising:

a base layer encoder that is configured to receive a video signal and to provide a base layer stream based on the video signal; and

an enhancement layer encoder that is configured to receive a difference signal and to provide an enhancement layer video stream based on the difference signal, and includes:

a plurality of discrete cosine transform (DCT) modules, each providing a different precision, and

a selection system that is configured to select a DCT module of the plurality of DCT modules for performing DCT computation on the difference signal.

2-3 (Canceled)

4. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module based on an encoding bit rate.

5. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module based on a required quality level.

6. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module based on a decoder capability.

7. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module based on bandwidth availability.

8. A computer-readable storage medium storing computer program product including executable instructions for encoding a layered video signal, the program product comprising:

means for receiving a video signal and outputting an encoded base layer stream; and

means for encoding an enhancement layer, wherein the enhancement layer encoding means includes a plurality of discrete cosine transform (DCT) modules, each providing a different precision, and selection means for selecting a DCT module of the plurality of DCT modules for performing DCT computation.

9-10 (Canceled)

11. A method of encoding a video signal in a layered manner, comprising:

receiving the video signal in a base layer encoding system;

outputting an encoded base layer stream;

receiving data from the base layer encoding system into an enhancement layer encoding system that includes a plurality of discrete cosine transform (DCT) modules

selecting a discrete cosine transform (DCT) module of a plurality of DCT modules for performing DCT computation on the data; and

generating an encoded enhancement layer stream using the select DCT module,

wherein each of the plurality of DCT modules provides a different precision.

12. A layered video decoding system, comprising:

a base layer decoder for receiving and decoding a base layer video stream; and

an enhancement layer decoder for receiving an enhancement layer video stream and generating a decoded enhanced video output, wherein:

the base layer decoder includes a single inverse discrete cosine transform (IDCT) module, and

the enhancement layer decoder includes:

a plurality of IDCT modules; and

a selection system for selecting an IDCT module of the plurality of IDCT modules based on factors including an available level of computing resources.

13. The layered video decoding system of claim 12, wherein each of the plurality of IDCT modules comprises a different precision.

14 (Cancelled)

15. The layered video decoding system of claim 12, wherein the selection system selects the IDCT module of the plurality of IDCT modules based on a preferred bit rate.

16. The layered video decoding system of claim 12, wherein the selection system selects the IDCT module of the plurality of IDCT modules based on a required quality level.

17. The layered video decoding system of claim 12, wherein the selection system selects the IDCT module of the plurality of IDCT modules based on a communication bandwidth.

18. A computer-readable storage medium storing computer program product including executable instructions for decoding a layered video stream, the program product comprising:

means for receiving and decoding a base layer video stream; and

means for receiving an enhancement layer video stream and generating a decoded enhanced video output,

wherein

the means for receiving and decoding the base layer video stream includes a single inverse discrete cosine transform (IDCT) module, and

the means for receiving and decoding the enhancement layer video stream includes:

a plurality of IDCT modules; and

means for selecting one of the IDCT modules based on at least one of an available level of computing resources, an encoding bit rate, a required quality level, a decoder capability and a bandwidth availability.

19. The program product of claim 18, wherein each of the plurality of IDCT modules comprises a different precision.

20 (Cancelled)

21. A method of decoding a layered video stream, comprising:

receiving an encoded base layer stream into a base layer decoder;

decoding the encoded base layer stream using a single inverse discrete cosine transform (IDCT) and generating a decoded base layer stream;

receiving an encoded enhancement layer stream into an enhancement layer decoder that includes a plurality of IDCT modules;

selecting an IDCT module of the plurality of IDCT modules based on at least one of an available level of computing resources, an encoding bit rate, a required quality level, a decoder capability and a bandwidth availability; and

decoding the encoded enhancement layer using the select IDCT module.

22. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module based on an available level of computing resources.

23. The layered video encoding system of claim 1, wherein the selection system is configured to select the DCT module before the DCT computation is performed.

24. The medium of claim 8, wherein

the selection means is configured to select the DCT module based on at least one of: an available level of computing resources, an encoding bit rate, a required quality level, a decoder capability and a bandwidth availability.

25. The medium of claim 8, wherein

the selection means is configured to select the DCT module before the DCT computation is performed.

EVIDENCE APPENDIX

No evidence has been submitted that is relied upon by the appellant in this appeal.

RELATED PROCEEDINGS APPENDIX

Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.